

The Taxonomic Position and the Scientific Name of the Big Tree known as *Sequoia gigantea*

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FOR NEARLY A CENTURY it has been customary to classify the big tree as *Sequoia gigantea* Dcne., placing it in the same genus with the only other living species, *Sequoia sempervirens* (Lamb.) Endl., the redwood. Both the taxonomic placement and the nomenclature are now at issue. Buchholz (1939: 536) proposed that the big tree be considered a distinct genus, and he renamed the tree *Sequoiadendron giganteum* (Lindl.) Buchholz. This classification was not kindly received. Later, to obtain the consensus of the Californian botanists, Dayton (1943: 209–219) sent them a questionnaire, then reported on and summarized their replies. Of the 29 answering, 24 preferred the name *Sequoia gigantea*. Many of the passages quoted show that these were preferences based on old custom or sentiment, and that few of them were willing to accept whatever name proved correct under the laws of nomenclature. Only 3 of the 29, on consideration of the botanical characters of the big tree, came to the conclusion that it represented a distinct genus and should be called *Sequoiadendron*; and of the three, two were willing to accept it only provisionally. The replies to this questionnaire make an interest-

ing psychological document, but its majority vote does not settle either the taxonomy or the nomenclature of the big tree. No more does the fact that "the National Park Service, which has almost exclusive custody of this tree, has formally adopted the name *Sequoia gigantea* for it" (Dayton, 1943: 210) settle the question.

The first issue is the generic status of the trees. Though the two species differ conspicuously in foliage and in cone structure, these differences have long been generally considered of specific and not of generic value. *Sequoiadendron*, when described by Buchholz, was carefully documented, and his tabular comparison contains an impressive total of combined generic and specific characters for his monotypic genus. This is readily available to botanists, so it does not seem necessary to quote it in full here, but it does seem appropriate to select and repeat those macroscopic characters of stem, leaf, and cone which seem of generic import.

Sequoiadendron giganteum

Staminate cones sessile
Ovulate cones remaining green and attached to tree for many years after maturity of seeds, becoming 5–7 cm. long, the axis very stout and woody, with 25–40 wedge-shaped scales that are not easily

Sequoia sempervirens

Staminate cones stipitate
Ovulate cones turning brown and shedding the seeds at maturity, becoming 2–3 cm. long, the axis relatively slender, with 15–20 obliquely shield-shaped scales that are easily broken off,

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broken off, terminated by a long terete spine, somewhat persistent, the scales bearing at pollination 3-12 or more erect ovules in double crescentic row, the ovules becoming 3-9 seeds in a (single or) double row on the surface of the scale, maturing the embryos in two seasons

Seeds about 200 per cone, 5-7 mm. long, with two thin wings broader than the body of the seed

Buds naked

Vegetative reproduction none

Leaves all small, of only one kind, not petioled

Stem habit stout, the branches turning upward at tip

terminated by a long flattened spine, usually deciduous, the scales bearing at pollination 3-7 erect ovules in single arched row, the ovules becoming 2-5 seeds in a single row near the margin of the scale, maturing the embryos in one season

Seeds about 60 per cone, 3-4.5 mm. long, with two spongy wings not as broad as the body of the seed

Buds scaly

Vegetative reproduction abundant

Leaves dimorphic, the vigorous terminal shoots with small scale-like leaves; other branches with large scythe-shaped, petioled leaves

Stem habit more slender, the branches horizontal or drooping

Leaves often spreading in 2 ranks, linear or linear-lanceolate, contracted above base, usually flattened and grooved above, without or rarely with stomata, with 2 (rarely 4) resin ducts, leaves without persistent leaf bases

Cupressus

Stamens with 2-6 anther cells

Pistillate cone ripening in 2 seasons, scales with 15-20 seeds

Seeds with narrow hard wings

Cotyledons 3-4

Branchlets 4-angled (or in some species flattened or terete), irregularly disposed

Leaves scale-like, minutely denticulate-ciliate

Thujaopsis

Staminate flowers with 6-10 pairs of stamens

Pistillate cones subglobose, the scales 6-8 with a boss or mucro below the apex, 4-6 pairs fertile, only the upper pair sterile, the fertile scales with 3-5 seeds

Leaves decussate, the lateral ones somewhat spreading, ovate-lanceolate and curved, with glaucous white patches below

Tsuga

Staminate cones axillary, globose, anthers transversely dehiscent

Pistillate cones 1.5-7.5 cm. long, cotyledons 3-6

Leaves spirally attached, 2-ranked, flattened, and stomatiferous below or on both sides, narrowed into

Leaves spirally arranged, linear, usually 4-angled (or in some species 3-angled or flat), with stomata on 1 or 4 sides, with 2 or 0 resin ducts, the leaves attached by peg-like bases which are persistent on the branchlet

Chamaecyparis

Stamens with 2-4 anther cells

Pistillate cone ripening in 1 (or 2) seasons, scales with 1-5 seeds

Seeds with broad gauzy wings

Cotyledons 2

Branchlets frond-like, usually flattened

Leaves scale-like, entire

Thuja

Staminate flowers with 6-12 decussate stamens

Pistillate cones ovoid-oblong or ovoid, scales with an apical thickened ridge or boss, only the 2-3 middle pairs fertile, these with 2-3 seeds

Leaves decussate, scale-like, the lateral ones nearly covering the facial ones, with or without glaucous white patches below

Picea

Staminate cones terminal, ament-like, anthers longitudinally dehiscent

Pistillate cones 2-15 cm. long, cotyledons 5-10

Leaves spirally attached and arranged, usually 4-angled (or in a few species 3-angled or flat), with

Buchholz also tabulates numerous differences in the gametophytes and in the development of the embryos.

This tabulation shows the generic characters to be numerous and impressive. A conclusion might be drawn here, but it is better to consider first other comparable pairs of genera in the Pinaceae or its segregate related families. The following have long been and are now almost universally accepted as genera:

Abies

Staminate cones oval

Pistillate cones erect, with the axis persistent, the stipitate scales deciduous

Cotyledons 4-5

Winter buds usually resinous

Picea

Staminate cones catkin-like

Pistillate cones diverging or pendant, shedding as a whole with the sessile scales attached

Cotyledons 5-10

Winter buds without resin

a short petiole, in cross section with 1 resin duct below the fibrovascular bundle

stomata on 1 or 4 sides, with 2 lateral resin ducts (or none)

Taxodium

Sequoia (in former broad sense, including *S. sempervirens* and *S. gigantea*)

Staminate flowers in elongate spikes or panicles, scales with 5-9 sporangia

Staminate cones ovoid, terminal or axillary, scales with 2-5 sporangia

Pistillate cones subglobose or obovoid, scales 2-seeded, thick, coriaceous, peltate, the apex a 4-sided, often mucronate disc

Pistillate cones oblong-ovoid, scales 3-12-seeded, woody, wedge-shaped, often mucronate

Seeds with 3 thick wings, cotyledons 4-9, embryos 2

Seeds with 2 wings, cotyledons 2-5, embryos 2-5

Buds scaly

Buds scaly or naked

Branchlets of 2 kinds, those near apex persistent, those lower and lateral deciduous

Branchlets of 1 or 2 kinds, persistent

Short shoots persistent

Short shoots deciduous

We should probably mention the recently described genus *Metasequoia* with one living species and many fossil ones, since there is such a mass of writing on it. Its generic name would suggest a close relationship to *Sequoia*, but it has many different characters, and, significantly, the cone scales are decussate instead of spiral. It is not a close relative of *Sequoia*. The generic differences are summarized by Chaney (1951: 180).

After this review of the characters that have proved significant and acceptable for the separation of other pairs of closely related genera, we re-examine *Sequoia*. It is clear to the writers that *Sequoia* and *Sequoiadendron* are true genera, distinguished by many more contrasting, fundamental characters than those that form the basis for separation of numerous others among the widely accepted genera in the Coniferae.

Accepting, now, as genera, the two units compared, we review the nomenclature of the living species.

SYNONYMY OF SEQUOIA

Sequoia sempervirens (D. Don in Lamb.) Endl., Syn. Conif. 198, 1847.

Taxodium sempervirens D. Don in Lamb., Gen. Pinus 2: 24, 1824; also ed. 2, 2: 107, pl. 48, 1828.

Schubertia? sempervirens (D. Don in Lamb.) Spach, Hist. Nat. Vég. 11: 353, 1842. (*Schubertia* is a nomen genericum rejiciendum.)

Sequoia gigantea Endl., Syn. Conif. 198, 1847, not of Dcne. 1854 which is *Sequoiadendron giganteum*.

Sequoia religiosa Presl, Böhmische Gesell. Wiss., Abhandl. V, 6: 597, 1851; and reprinted as Epimel Bot. 237, 1851.

Condyllocarpus Salisb., in Lamb., Gen. Pinus, ed. minor 2: 120, 1832, published by D. Don in synonymy of *Taxodium sempervirens* D. Don in Lamb.

Gigantabies taxifolia J. Nelson, under pseudonym Senilis, Pinac. 78, 1866.

Sequoia taxifolia Kirwan, Pinac. 246, 1868.

Steinhauera sempervirens (D. Don in Lamb.) Voss, Deut. Dendrol. Gesell., Mitt. 16 (1907): 90, 1908, the name *Steinhauera* now being a nomen genericum rejiciendum.

The customary name of this tree remains unchanged.

SYNONYMY OF SEQUIADENDRON

Sequoiadendron giganteum (Lindl.) Buchholz, Amer. Jour. Bot. 26: 536-538, 1939.

Wellingtonia gigantea Lindl., Gard. Chron., 819-820, 823, 1853; and Hooker's Jour. Bot. & Kew Misc. 7: 26, 1855; not *Wellingtonia* Meisn. (1840) of the Sabiaceae.

Americus gigantea (Lindl.) Anon., Description of the Great Tree, recently felled upon the Sierra Nevada, California, now placed for public exhibition, in the spacious racket court of the Union Club, No. 596 Broadway, adjoining the Metropolitan Hotel, New York, p. 6-7, 1854.

Herald Job Printing Office, New York.
Sequoia Wellingtonia Seem., Bonplandia 3:
 27, 1855, Feb. 1.

Sequoia gigantea (Lindl.) Dcne., Soc. Bot.
 France, Bul. 1: 70-71, 1854 (?Aug.; ses-
 sion of June 28), not of Endl. (1847)
 which is *S. sempervirens* (D. Don in Lamb.)
 Endl.

Taxodium Washingtonium Winslow, Calif.
 Farmer 2: 58, 1854, Aug. 24; provisional
 name.

Washingtonia Californica Winslow, Calif.
 Farmer 2: 58, 1854, Aug. 24; provisional
 name and nomen genericum rejiciendum;
 not *Washingtonia* H. Wendl. (1879), Pal-
 mae, nomen genericum conservandum.

Washingtonia Americana Hort. Am. ex Gor-
 don, Pinetum Suppl. 106, 1862, pub-
 lished in synonymy.

Gigantabies Wellingtoniana J. Nelson, under
 pseudonym Senilis, Pinac. 79-83, 1866.

Taxodium giganteum (Lindl.) Kellogg &
 Behr, The Pacific, p. 53, 1855, May 7;
 reprinted as Calif. Acad. Sci., Proc. 1:
 ed. 2, 51, 1873.

Americanus giganteus (Lindl.) Anon. emend.
 Gordon, Pinetum 330, 1858, published
 in synonymy.

Sequoia washingtoniana (Winslow emend.
 Sudw.) Sudw., U. S. Dept. Agr., Div.
 Forestry, Bul. 14: 61, 1897.

Steinhauera gigantea (Lindl.) Ktze. in Voss,
 Deut. Dendrol. Gesell., Mitt. 16(1907):
 90, 1908, nomen genericum rejiciendum,
 the name being based on three fossil
 species, known only from the cones.

The existence of the big tree was known
 first through the narratives of several travelers,
 but as they did not publish any scientific
 names there is no need to give the details of
 their observations. Hunters visited the Cala-
 veras Grove in 1850 and 1852, but their tales
 of the size of the big trees were disbelieved.
 In 1853 Captain Hanford and William Lap-
 ham visited the grove to verify the stories.
 Mr. Lapham foresaw the value of the location

and the public interest in the trees, so he
 took possession of the area and built a hotel
 there (Anable, 1950: 1-5).

GENERIC NAME OF THE BIG TREE

The first generic name of the big tree was
Wellingtonia, published by Lindley (1853a:
 819-820; 1853b: 823). These two articles were
 unsigned, but they were a part of the horti-
 cultural section of the *Gardeners' Chronicle*,
 the part edited by Professor John Lindley. In
 the first article he discussed various reputed
 western North American conifers, then men-
 tioned and named the new monotypic genus
Wellingtonia gigantea. From *Sequoia* he sepa-
 rated his new genus *Wellingtonia* and indicated
 that it was distinguished by the large size of
 the trunk, 250-320 feet in height and 10-20
 feet in diameter, by the mature branches being
 round like those of the juniper, and by the
 cones being about 2½ inches long, 2 inches
 across. His informal, running account did not
 completely document the genus, and the trunk
 size mentioned was not significant, but the
 characters of branch and cone, listed above,
 were enough to serve as a description, and
 his name *Wellingtonia* was effectively pub-
 lished. Both the generic and specific names
 were newly coined and were not transfers
 from any previous publication. Lindley ex-
 plained (1853a: 820) the appropriateness of
 his generic name: "... and we think that no
 one will differ from us in feeling that the most
 appropriate name to be proposed for the most
 gigantic tree which has been revealed to us
 by modern discovery is that of the greatest
 of modern heroes. Wellington stands as high
 above his contemporaries as the Californian
 tree above all the surrounding foresters [sic].
 Let it then bear henceforward the name of
 WELLINGTONIA GIGANTEA." Professor Lind-
 ley quite misjudged the temper and the pa-
 triotism of the Americans. Numerous protests
 were published at the naming of the American
 big tree as *Wellingtonia*, and several substitute
 names were proposed by the patriotic Amer-
 icans.

Lindley in his second account (1853b: 823) republished the binomial *Wellingtonia gigantea*, giving the generic characters in a formal description of six lines of Latin, then other characters which appear in his following English discussion. He contrasted his new genus *Wellingtonia* with both *Sequoia* and *Sciadopitys*, giving well-stated generic characters. Hence, these two accounts on adjacent pages presented *Wellingtonia gigantea* Lindley, new genus and species, well described and contrasted, and the whole effectively published. However, it so happened that the generic name *Wellingtonia* Lindl. was illegitimate, it being a later homonym of *Wellingtonia* Meisn. (1840) for a genus in the Sabiaceae.

The second generic name for the big tree was *Americus*, published anonymously in 1854. In that year, a cross section of a tree recently felled in California was placed on exhibit at the Union Club, New York. A pamphlet announcing the exhibit was printed to arouse interest in it and to draw spectators—"... admission 25 cents, children half price." This was no more a scientific publication than is a circus program or a symphony orchestra program. It was anonymous, but it was printed by the Herald Job Printing Office, New York, and was dated 1854. Besides announcing the exhibit, it contained several articles, mostly reprintings of previously issued articles. The first article, on pages 4 and 5, is entitled "The Great Tree of the Sierra Nevada, California," and is a popular account adapted from various other publications. The second article (Anon., 1854: 6-7) is entitled "Gigantic Tree in California"; it was copied paragraph after paragraph from the account in the *Illustrated London News*, February 11, 1854, which was a direct copy of Lindley's accounts in the *Gardeners' Chronicle* (1853a,b), except that in the New York pamphlet the new generic name *Americus* was substituted at every place at which the name *Wellingtonia* occurred in the originals. Thus the new binomial *Americus gigantea* Anon. was published for the big tree. This name has

seldom been noticed in botanical writings. It was mentioned by Gordon (1858: 330) in the synonymy of *Wellingtonia gigantea* Lindl., but emended to the form *Americanus giganteus* Hort. Amer. This was a "corrected" version of *Americus gigantea* Anon. (1854). To someone, *Americanus* seemed preferable, but *Americus* was an equally possible name, and it had priority.

The anonymous compiler of this prospectus in which *Americus* was described obviously had little or no botanical knowledge. He was certainly unaware of the fact that Lindley's generic name *Wellingtonia* was invalid, being a later homonym. So, at that time, the big tree had no valid generic name and needed one if it was to be accepted as a new genus distinct from *Sequoia* and *Taxodium*. In any case, the generic name *Americanus* was illegitimate, having been published only in synonymy. On the other hand, the generic name *Americus* was effectively published, and the lengthy description and discussion contained ample details of description, thus validating the name.

The generic name *Steinhauera* was published by Presl (1838: 202) and applied to three new species of plants found as fossils in lignite schist in Bohemia. This name was effectively published, and the genus contained three valid binomials. Later, Kuntze decided that these fossil species belonged to the same genus as the living big tree. His combination appeared as *Steinhauera gigantea* (Lindl.) Ktze. in Voss (1908: 90). This generic name was correct then, but more recently it has been made illegitimate, being listed in the 1952 International Code of Botanical Nomenclature (Stockholm, 1950) as a nomen genericum rejiciendum, whereas *Sequoia* Endl. is made a nomen genericum conservandum. This legal action applies when the generic concept is the broad one, including in *Sequoia* both *S. sempervirens* and *S. gigantea*. It does not apply to the narrower generic concept, which we follow, that recognizes *S. gigantea* as a separate genus. However, another provision does ap-

ply. Article 68 of the same 1952 International Code says, "When a taxon of recent plants, algae excepted, and a taxon, of the same rank, of fossil or subfossil plants are united, the correct name or epithet of the former taxon must be accepted, even if it is antedated by that of the latter." This applies exactly to the issue at hand and rejects the name *Steinhauera* for our living trees.

The next name for the big tree was *Gigantabies*, with the apparent binomial *Gigantabies Wellingtoniana* [J. Nelson] published under the pseudonym Senilis. This appeared in a privately printed book, offered for sale for 10/6 by Johannes Senilis, Lymington, Hants. It is recorded in English bibliographic sources that the author's real name was John Nelson. The book title is "Pinaceae: being a handbook of the firs and pines," and it was published (1866) in London by Hatchard and Company. This book was soon reviewed, apparently by the editor, in the *Gardeners' Chronicle* (1866: 542) and wholly condemned: "The truth is, the author is not qualified for writing a book upon Conifers. The reader can judge of his literary qualifications from the verbose ungrammatical sentences which we have above quoted. His qualifications for dealing with the subject he has chosen are still less. He appears to be unacquainted with the very elements of Botany and Physiology; seems not to have the most distant idea of the principles on which, by the labours of many minds of the highest talent, the present system of systematic botany has been based; does not know what has been already done, what has been already proposed and rejected by general consent, and why. He has, apparently, in his present condition no one qualification which suits him for such a work." Nelson put the redwood under the same name, *Gigantabies*, and gave it the new name *Gigantabies Taxifolia*. If taken as a generic name, *Gigantabies* must be placed as a later synonym of *Sequoia*, because *G. Taxifolia* was only a renaming of the earlier *S. sempervirens* (D. Don in Lamb.) Endl. Nelson did not cite

S. sempervirens in synonymy, but he did mention the early collections of it by Menzies, Douglas, Hartweg, and the Russians; located it in California, particularly on the Santa Cruz range; and by his lengthy description made abundantly clear that his new tree was the well-known redwood, *Sequoia sempervirens*. Article 16 of the 1952 International Code reads: "For any taxon from order to genus inclusive, the correct name is the earliest legitimate one validly published with the same rank. For any taxon below the rank of genus the correct name is the combination of the generic name with the earliest available legitimate epithet or epithets validly published with the same rank." By these legal provisions, *Gigantabies Taxifolia* J. Nelson is illegitimate.

We could dispose of the remaining name *Gigantabies Wellingtoniana* on the same grounds, but if the big tree was accepted as a distinct genus, it was at this time nameless, hence the status of the name *Gigantabies* needs scrutiny. After some initial poems, Nelson came to his technical treatment of the Pinaceae which he subdivided into divisions, subdivisions, sections, sub-sections, and species, and we quote (pp. 26-27).

TECHNICALITIES used in the CLASSIFICATION and NOMENCLATURE

S.D., (SUB-DIVISION.) A cognate family containing few or many specifically distinct *species*, and of these there may be a few, or many *quasi-species*, *varieties*, and *sub-varieties*.

SECTION, I use as a group of a S.D. having numerous and dissimilar *species*, and which are arranged in *sections* having some peculiarity or other, as distinguishing one *section* from another in the S.D. to which they belong. SUB-SECTION I use after the same manner as *section*. . .

SPECIES, as a specifically distinct tree or plant, having one or more well marked and constant characteristics, distinguishing it from the other *species* of a S.D.; and which reproduces itself true from seed.

CLASSIFICATION.

ARRANGEMENT.

Pinaceae

Division I.—CONIFERAE.—CONE-BEARING FIRS AND PINES.

Division II.—BACCIFERAE.—BERRY AND FRUIT-BEARING PINES.

CONIFERAE

S.D. I.—ABIETINEAE.—The Fir Tribe.

- § 1. *Intermedia*.—The Intermediate Fir.
- § 2. *Picea*.—The Pitch or Silver Fir.
- § 3. *Vera*.—The True or Spruce Fir.

S.D. II.—CEDRUS.—The Cedar.

S.D. III.—CUPRESSINEAE.—The Cypress Tribe.

- § 1. *Actinostrobeae*.—The Rayed-scaled Cypress
 - Sub. § 1.—OCTOVALVUS.—Eight-valved.
 - Sub. § 2. SEXAVALVUS.—Six-valved.
 - Sub. § 3.—QUARTOVALVUS.—Four-valved.
- § 2. *Arthrotaxia*.—The Jointed-branched Cypress.
- § 3. *Cryptomeria*.—The Cedar-like Cypress.
- § 4. *Cupressstellata*.—The Star-coned Cypress.
- § 5. *Cupresspinnata*.—The Feathery-sprayed Cypress.
- § 6. *Thuriferae*.—The Arbor Vitae.
 - Sub. § 1.—BIOTA.—The Oriental.
 - Sub. § 2.—LIBOCEDRUS.—The very Fragrant.
 - Sub. § 3.—THUJA.—The Occidental.
- § 7. *Verae*.—The True Cypress
 - Sub. § 1.—CHAMAECYPARIS.—The Ground Cypress.
 - Sub. § 2.—CUPRESSUS.—The Prototype.
 - Sub. § 3.—RETINOSPORA.—Resinous-seeded.

S.D. IV.—GIGANTABIES.—The Giant or Mammoth Fir.

By his arrangement *Biota*, *Libocedrus*, *Thuja*, *Chamaecyparis*, *Cupressus*, and *Retinospora* were made sub-sections; *Picea* and *Cryptomeria* were made sections; *Abietineae*, *Cedrus*, *Cupressineae*, and *Gigantabies* were his four sub-divisions; and *Coniferae* and *Bacciferae* were his two divisions. Genera, well accepted by botanists, were by Nelson made sub-sections, sections, or sub-divisions. In the taxonomic treatment, specific names were combined with all of these, forming apparent binomials. *Gigantabies Wellingtoniana* is one such. Surely, the combination of the name of a species with that of a sub-division does not make a binomial. Applicable sections of the 1952 International Code are: Article 13, "A plant may therefore be classified in subordinated categories in the following order: Regnum vegetabile, Divisio, Subdivisio, Classis, Subclassis, Ordo, Subordo, Familia, Subfamilia, Tribus, Subtribus, Genus, Subgenus, Sectio, Subsectio, Species." Then by Article 15, "The relative order of the categories specified above in Art. 12-14 must not be altered.

"Names given to taxa which are at the same

time denoted by misplaced terms are treated as not validly published. . . ."

So, *Gigantabies* was not a generic name; *Gigantabies Wellingtoniana* was not a binomial, and the whole is illegitimate.

Finally, the generic name *Sequoiadendron* was published for the monotypic genus of the big tree, by Buchholz (1939: 536). This was based upon *Wellingtonia gigantea* Lindl. and included the concepts and the synonyms published by Winslow, Decaisne, Seemann, Kellogg & Behr, Sudworth, and Kuntze. The generic name was effectively published and was accompanied by a Latin diagnosis, a type species was designated, and there was given a fully detailed comparison with *Sequoia* which he interpreted as represented by only one living species, the redwood, *S. sempervirens*.

Sequoiadendron of Buchholz has now had some acceptance, as by Rehder (1940: 48-49; 1949: 41), L. H. & E. Z. Bailey (1941: 680), Rickett (1950: 15), and Stebbins (1948: 95), and reaffirmation by Buchholz (1948: 90).

The investigation by Buchholz was careful, detailed, and original. It revealed many morphological characters that were unknown before. It detailed the many important differences between the big tree and the redwood. Buchholz classified the big tree as a separate genus and published for it the name *Sequoiadendron*. We have reviewed the same investigation and concur that *Sequoiadendron* is a good and distinct genus. The only flaw is in priority, as there is an earlier name, *Americus*.

On every score the generic name *Americus* deserves to be outlawed. It was published in an anonymous advertising circular. It was seen by few botanists and was adopted by none. The pamphlet is excessively rare now; the copy consulted for us is in the library of the New York Botanical Garden. The anonymous writer made no botanical study of the tree or its trunk. He wrote no description of the tree, merely copied the one validating *Wellingtonia gigantea*. The only item contributed by the anonymous writer was the sub-

stitution of the name *Americus* for each occurrence of *Wellingtonia* in the original article by Lindley. He did not assert that the name *Wellingtonia* was illegitimate. That a new generic name was needed was an accident quite unknown to the anonymous writer. Neither the man nor the name deserves recognition. We think there is every reason for making the generic name *Americus* a nomen genericum rejiciendum. We propose that the next International Botanical Congress adopt *Sequoiadendron* Buchh. as a nomen genericum conservandum, and treat *Americus* as a nomen genericum rejiciendum.

SPECIFIC EPITHET OF THE BIG TREE

Though the waters one must traverse in reviewing the generic history of the big tree may seem somewhat turbid, they are nothing in comparison to the muddy, swirling waters one must sail over in the historic quest of the correct specific epithet.

It was long thought that the first scientific name for the big tree was *Sequoia gigantea* Endl. (1847: 198). This was rejected by Buchholz, as it had been by many others, but it needs careful analysis and discussion to dispose of it fully. We quote its original treatment in full:

2. SEQUOIA GIGANTEA ENDL.

Sequoia foliis linearibus (1½-2") acutis subtus glauco pulverulentis.

Taxodii species Douglas in Bot. Mag. Comp. II. 150.

Abies religiosa Hook. et Arnott ad Beechey 160. non Humb.

Taxodium sempervirens Hook. et Arnott ad Beechey 392. Hooker Ic. t. 379. Habitat in California. (Dougl.)

Arbor trecentorum pedum altitudinem attingens, trunci ambitu trigintapedali.

In this same passage Endlicher described the new genus *Sequoia*, and his species No. 1 was called *S. sempervirens* Endl. [or as the authority should now be written, (D. Don in Lamb.) Endl.], the accepted name of the redwood, though his basonym was briefly attributed only to Lambert.

Now, for *S. gigantea* Endl. The original publication included a description, a statement of the type locality (stated as habitat), and a collector, and the first synonym, *Taxodii species*, all of which rest upon the work of Douglas. Then, finally, there are two other synonyms which rest upon the work of Hooker and Arnott, and of Hooker, and a diagnosis. Let us first consider these last two synonyms:

Abies religiosa Hook. et Arnott ad Beechey 160, non Humb. This, in the sense of Hooker and Arnott, is a mixture of several diverse species and genera, but it includes only the following reference to Californian trees, "I was informed that there are trees of this species in the vallies between Santa Clara and Santa Cruz, 150 feet high, one of which was 25 feet in circumference." This is the only element in *Abies religiosa* sensu Hook. & Arn. which may have been based on *Sequoia* and might be selected with that in view to typify their specific concept. However, the only description given is that of the stature, 150 feet high and 25 feet in circumference, and this was only a hearsay report. That would apply to a young specimen of the big tree, but is in no way distinctive of it, and certainly is incorrect as a description of the full stature of a mature or large specimen of the big tree which is 250-330 feet in height and 40-56 feet in circumference at 10 feet above the base, or up to 90 feet at 6 feet above the base. The locality given, "in the vallies between Santa Clara and Santa Cruz," is far distant from any known grove or occurrence of the big tree, all of which are east of the central valley of California and at 4,600-8,500 feet altitude on the western slopes of the Sierra Nevada Mountains. On the other hand, both the stature and the locality given by Hooker and Arnott tally exactly with the size and a well-known, still existing stand of the redwood, *Sequoia sempervirens*. It is clear, then, that the only meager element in *Abies religiosa* sensu Hook. & Arnott, not of H.B.K., which applies to a Californian gymnosperm was probably in allusion to *Sequoia sempervirens*.

and certainly did not apply to the big tree. The first use of the name *Abies religiosa* (H. B.K.) Schlecht. & Cham. (*Linnaea* 5: 77, 1830) was based upon *Pinus religiosa* H.B.K. (*Nov. Gen & Sp.* 2: 5, 1817). This tree, still accepted as *Abies religiosa*, is native to the highlands of Mexico at from 1,200 to 3,450 meters altitude, from Durango and the Valley of Mexico south to Guatemala. It was named *religiosa* because of the traditional use of its branches to decorate the churches of its region. Obviously, the usage by Hooker and Arnott was a misapplication of the name *Abies religiosa*, the true usage of which is for a true fir tree, or "oyamel" of the Mexicans, a tree native to the mountains of Mexico and Guatemala.

The third synonym listed in the publication of *Sequoia gigantea* Endl. was "*Taxodium sempervirens* Hook et Arnott ad Beechey 392. Hooker Ic. t. 379." *Taxodium sempervirens* sensu Hook. & Arn. was printed in *The Botany of Captain Beechey's Voyage*, p. 392, 1840, and was merely a later usage of *T. sempervirens* D. Don in Lamb., the basonym of *Sequoia sempervirens* (D. Don in Lamb.) Endl., the accepted name for the redwood. Though we are dealing with a later usage of a previously published and valid name, we should examine the basis of the usage by Hooker and Arnott in 1840. Their publication was as follows:

1. *Taxodium sempervirens* Lamb. Pin. t. 643? Hook. Ic. Pl. ined.-*Abies religiosa*. supr. p. 184 (an Cham. et Schlecht?)

Of this we have seen no flowers nor fruit, and the leaves are nearly twice the length of those figured in Mr Lambert's work, shining on the upper side as in *Podocarpus*, and glaucous underneath. The tips of the branches exhibit buds formed of imbricated membranaceous concave shining scales, which resemble the scales at the base of the galbule in Lambert's description and figure quoted. Our plant is obviously what Douglas alludes to in his Journal (*Comp. Bot. Mag.* vol. II. p. 150.) in the following words:—"But the great beauty of the Californian vegetation is a species of *Taxodium*, which gives the mountains a most peculiar, I was almost going to say awful, appearance,—something which plainly tells that we are not in Europe. I have never seen the *Taxodium Nootkatense* of Née, except some specimens in the Lambertian herbarium, and have no work to refer to; but from recollection, I should say that the present species is distinct from it.

I have repeatedly measured specimens of this tree 270 feet long, and 32 feet round at three feet above the ground. Some few I saw upwards of 300 feet high, but none in which the thickness was greater than those I have instanced."

Taxodium sempervirens sensu Hook. et Arnott rested on four elements:

1. The name, and a reference to *T. sempervirens* Lamb., the basonym of *Sequoia sempervirens*, the redwood.

2. A reference to a plate prepared for Hooker's *Icones*, but then unpublished. This later appeared in volume 4: t. 379, 1841. It represented a sterile branch, collected by Lay and Collie in California, now identified as *Abies bracteata* (D. Don in Lamb.) Nutt. (1849), according to Rehder (1949: 647). The Latin diagnosis, a line and a third in length, given for *Sequoia gigantea* Endl., "foliis linearibus (1½-2") acutis subtus glauco pulverulentis," bears no resemblance to the characters of the big tree or to the small, bright yellow-green foliage of the redwood. It is apparent that Endlicher took these characters from the passage by Hooker and Arnott in *The Botany of Captain Beechey's Voyage*, where they wrote, "... the leaves are nearly twice the length of those figured in Mr Lambert's work, shining on the upper side as in *Podocarpus*, and glaucous underneath." Then, the diagnosis given by Hooker for *Sequoia gigantea* applied to *Abies bracteata*.

3. A reference to *Abies religiosa* sensu Hook. et Arnott, and doubtfully sensu Cham. & Schlecht. Our discussion just above points out that *Abies religiosa* (H.B.K.) Cham. & Schlecht. is a true fir tree, native of Central America. The sterile branch collected by Lay and Collie in California, indentified by Hooker and Arnott as *A. religiosa*, is now considered to represent a misidentified specimen of *Abies bracteata* Nutt.

4. A duplicated reference to *Taxodium* species of Douglas, which will be discussed below.

Now, reverting to the major elements of *Sequoia gigantea* Endl., the description, local-

ity, and collector, all of which allude to David Douglas and his *Taxodium* species. Douglas himself published no species of *Taxodium*. He was a very capable taxonomist and in his few months in London published papers and prepared manuscripts evidencing ability and productivity in this technical work. He was supreme as an explorer and botanical collector and left his indelible mark on the botany of North America and of the Pacific. He might well have published upon his observed *Taxodium*, but he perished on a mountain side in the Hawaiian Islands, apparently by murder. Douglas was an explorer, working for the Royal Horticultural Society of London, and he reported to it. One of his letters written at Monterey, Upper California, dated November 23, 1831, was published by Hooker (1836: 150), "But the great beauty of Californian vegetation is a species of *Taxodium*," etc. This passage was quoted by Hooker and Arnott, and above we quote their version which was complete, except that they omitted the following last sentence: "I possess fine specimens and seeds also." We discard Douglas' reference by memory to *Taxodium nootkatense* Nees, a name even yet unpublished, though Douglas may have known it as a manuscript name. Doubtless it was synonymous with *Cupressus nootkatensis* D. Don in Lamb. (1824), now accepted as *Chamaecyparis nootkatensis* (D. Don in Lamb.) Sudw. (1897), the Alaska cedar. Douglas' allusion was a misidentification based on a vague memory of that coastal tree of northwestern America. That leaves in his passage only his statements concerning the awesome Californian tree species that he had seen, 270 or more than 300 feet tall and 32 feet in circumference 3 feet from the ground. He collected fine specimens and seeds. Doubtless these were sent to England, but they did not arrive. No such plant is included in the list of plants introduced by Mr. Douglas in 1834. A subsequent collector, William Lobb, who followed Douglas to Northwest America and California, wrote as follows, and the letter was published by Lind-

ley (1854: 22): "I am well acquainted with every part of the country trod by Douglas . . . seldom 30 miles from the coast and 160 or more from the nearest big tree." Lindley continued, "It is therefore evident that no materials exist for determining what DOUGLAS really meant by his 'Taxodium,' which may or may not have belonged to that genus, or, as ENDLICHER conjectured, to *Sequoia*. But species in natural history cannot be founded upon conjecture." Thus, it is clear that Douglas on his trips never approached any of the big tree groves, and that his specimens which were probably of the redwood were lost in transit to England. The few descriptive words of his that were published posthumously are only measurements of some large trees, and they tally well with the dimensions and proportions of the redwood which was common in the regions he traversed. In sum, there is no part of the *Taxodium* species mentioned by Douglas that can be demonstrated to apply to the big tree. Consequently, *Sequoia gigantea* Endl. (1847) is in larger part a synonym of *S. sempervirens* and, in smaller parts, of *Abies religiosa* (H.B.K.) Schlecht. & Cham. and *Abies bracteata* (D. Don in Lamb.) Nutt. No part of it has been demonstrated to be based on the big tree, so it is impossible to typify the species by any fragment of the original concept which action might preserve the epithet for application to the big tree.

As we have demonstrated earlier, the generic name *Wellingtonia* of Lindley was a later homonym and hence illegitimate. For those who still retain the big tree and the redwood in the single genus *Sequoia*, this specific epithet *gigantea* of Lindley is not available, as on transfer to *Sequoia* it becomes a later homonym of *S. gigantea* Endl., which is in larger part a synonym of *S. sempervirens*. If the big tree is best classified as a distinct genus, whether called *Americus* or *Sequoiadendron*, the epithet *gigantea* of Lindl. is available in either combination.

Sequoia gigantea (Lindl.) Dcne. (1854: 70-71), the next binomial, appeared in a pub-

lished account of remarks by Decaisne at a meeting of the Société Botanique de France. He demonstrated specimens of the redwood and of the big tree, referred to *Wellingtonia* Lindl., discussed the distinctive botanical characters, disagreed with Lindley that they formed two genera, then gave his conclusion that they were *Sequoia sempervirens* and *Sequoia gigantea*. This latter binomial has long been taken as *Sequoia gigantea* Dcne., but it seems actually a transfer, *Sequoia gigantea* (Lindl.) Dcne., based upon *Wellingtonia gigantea* Lindl., and it has already been so interpreted by Little (1944: 276). Another interpretation might be that *Sequoia gigantea* Dcne. was an independent new species, based upon a description solely of the specimens at hand, sent to the Paris Museum by M. Boursier de la Rivière, consular agent of France. These possible interpretations lose their importance when it is realized that the specific epithet is invalid in either case, being a later homonym of *Sequoia gigantea* Endl. (1847: 198).

In 1854 the binomial *Americus gigantea* (Lindl.) Anon. was published. We have previously dealt with the new generic name. The specific epithet was obviously one transferred from *Wellingtonia gigantea* Lindl. and was based upon the same description and specimens. It did not provide a new specific name.

Two other new binomials were published in 1854. The name *Taxodium Washingtonium* Winslow was printed in a weekly newspaper called the California Farmer (Winslow, 1854: 58), and in the same paragraph another name, *Washingtonia Californica* Winslow, was proposed. These names have been given varied treatments, accepted, corrected, or rejected, by various botanists. As this local farm newspaper is not readily available to botanists and as the exact wording of the proposals of Winslow is decisive, his whole one-page article is reproduced here (Fig. 1). It was a letter written by Dr. C. F. Winslow on August 8, 1854, from Washington Mammoth Grove [or Calaveras Grove]. It was a description of his 15-mile trip by carriage road, the incidents of

the trip, and his impressions, stated at length in an elaborate and flowery style of writing. He stated the size of several of the big trees and quoted many details told him by the hotel proprietor. He gave a few descriptive details of leaves and cones. He alluded to the publication by the English botanist, Professor Lindley, of the tree as *Wellingtonia Gigantea*, but objected that this generic name honoring an English military hero was distasteful to and unacceptable by Americans. Then Winslow renamed Lindley's *Wellingtonia Gigantea* as follows: "If the 'Big Tree' be not a *Taxodium*, let it be called now and forever *Taxodium Washingtonium*. If it should be properly ranked as a new genus, then let it be called to the end of time, *Washingtonia Californica*. The generic name indicates unparalleled greatness and grandeur; its specific name, the only locality in the world where it is found. No names can be more appropriate, and if it be in accordance with the views of American botanists, I trust the scientific honor of our country may be vindicated from foreign indelicacy by boldly discarding the name now applied to it, and by affixing to it that of the immortal man whose memory we all love and honor, and teach our children to adore. . . . Under any and all circumstances, however, whether of perpetuity or extinction, the name of Wellington should be discarded and that of WASHINGTON attached to it, and transmitted to the schools of future ages."

Now, to consider the two binomials published by Winslow. They were immediately reduced to the synonymy of his own *Sequoia Wellingtonia* Seem. by Seemann (1858: 345–346) in his second and extensive account of the tree, and he pointed out that the big tree had already been named as a genus by Lindley in 1853 and as a species by himself in February, 1855. Winslow's names fell into the discard and received little attention. It appears that most of those botanists who have considered his names at all have not consulted his original newspaper account, but one of the two reprintings of it that appeared in

meritorious, although they may not be named in the list of premiums.

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Dr. C. F. Winslow's Letters from the Mountains.

THE "BIG TREE."

WASHINGTON MOUNTAIN GROVE,
August 20, 1854.

DEAR SIR: At half-past three P.M. yesterday, we started from Murphy's for the Big Tree, on the stump of which I am now writing. The ride is fifteen miles long, and is one of the most varied and charming which I have ever enjoyed. At first you follow a ravine for several miles, hedged in by sloping and rounded hills, sparsely wooded with varieties of the conifers; and in the bottom of this winds a clear brook which forms the stream of the Union Water Company, for supplying the miners with water during the dry season at Murphy's Camp. Subsequently the beautiful ravine opens into a broad vale, which at last is lost in the gentle slopes and varying aspects of landscape that swell and charm the eye in all directions. A great variety of pines, oaks and other trees and shrubs add finish and endless charm to this fresh and virgin landscape. After gradually ascending for some miles by a winding and well made carriage road, you reach points where the lofty and magnificent pines open and afford prospects of distant mountain slopes and summits, covered to the uppermost ridge with such grand and magnificent coniferous forests that I will not attempt to describe them. The sun, alone with heated and golden beams, and the light, softened and mellowed by the radiating vapors of the highlands, lend tints to the verdant wilderness and towering ridges which heightened the charms and magnificence of the broad and wild panorama. The road was more or less shaded all the way by pines so gigantic as to awaken in me, who had never before seen the native and lofty forest scenery of the north temperate zone, the strongest feelings of wonder and admiration. I had never before conceived of the capacity of the various species of conifers to attain such enormous dimensions. They were often six feet through, and from one hundred and thirty to three hundred feet high, and so symmetrical and perfect in form as to impress me with new and more commanding ideas respecting the force and operation of the vital principle presiding over the nourishment and growth of organized bodies. The delicate and symmetrical development of some of these towering and gigantic vegetable forms filled the mind with emotions of the beautiful, similar to those felt at beholding the most perfect models of the human form wrought from marble or delineated on canvass. There they stand against the deep blue sky, cell having been added to cell by slow processes of growth, fashioned by the breath of the Almighty, until they have attained such strength as to defy the ordinary methods of violent destruction. All along the last few miles of the road I was filled with impressions wholly new, and often involuntarily ascribed myself to the idea that I was approaching the visible and actual presence of the Great One, who realized himself to Moses on the

heights of Sinai. Such sublime thoughts have already impressed my soul, and it is only here, in the midst of these living wonders of the mountain forests, that such conceptions have been awakened to their complete height of grandeur and awe. On the summit of these lofty mountains, amid the columns of this great temple of nature, I am compelled to bow down and acknowledge the utter nothingness of mortal man and the infinite greatness of the power that hovers around the globe and weaves a germ from the dust of the earth that shall outlast sixty human generations. But another order of reflections crowd upon the mind. What changes have transpired in the condition of people and of States since the germs shot down the root on which I record these thoughts. The golden age had not yet dawned on the Roman empire, and the ancestors of the present polished races of Great Britain, France and Germany, were naked and wandering savages in the wilderness and snowy forests of northern Europe. Within this time the man of Nazareth and the prophet of Mecca have re-created the dogmas and idolatrous worship of the benighted nations of Asia and Europe, and like the waves of the ocean, little and great kingdoms have arisen, and, melting away, mingled their elements with each other, until no trace exists of their former bounds or grandeur. How strangely interesting are all these multitudinous events when crowded by contrast into a space of time occupied by the growth and life of a single tree on these Alpine and lonely heights. If the lifetime of a single vegetable germ shall outlast and look down on all these stripes and transactions of the races of man for two thousand years; how ancient must be the earth, the parent and the stage of them all?

The height of this spot above the ocean is rather less than five thousand feet, and it is two thousand four hundred feet above Murphy's Camp. The road, gradually ascending for several miles over a varied landscape, becomes afterwards more level, or rather it undulates and winds for a long stretch among hills and valleys thickly wooded and fit for farms and deer parks. During the last three miles the ascent is steady and through a virgin wilderness of pines, firs, spruce, alders, vines and other cone bearing trees, whose magnitude perceptibly increases with the altitude of the locality. The whole surface of the hill sides is covered with herbage or plants, more or less verdant, and in spots there is a freshness to the verdure which reminds one of spring, and which contrasts strongly with the arid and dusty plains and hills of the lower sections of country. The wild raspberry, strawberry, pea and hazelnut mingle their humble or more prominent foliage with the diversified undergrowth of the forests, and here and there new and attractive flowers struck my eye so pleasingly that I was compelled at times to stop, gather, examine and admire them. The charm of these regions to the botanist would be in the freshness and luxuriance with which nature elaborates her vegetable forms. The vital principle, stimulated by the condensing vapors of the cool fresh of night, and nourished by a suitable pabulum in the decomposing soil, acts with a steady energy, and thousands of stately trees stand the hills in all directions, so lofty as to amaze the observer and to compel him when near them to strain his eyes to catch a view of their topmost offshoots. But the most amazing of all these vegetable productions is here, and nature, by peculiar geognostic arrangements, seems to have isolated them to startle and arrest the attention of mankind, and to strengthen scientific truth, teaching the special distribution of organic races. So far as known, the vegetable growth to which the name of "Big Tree" has been attached, grows in no other region of the Sierra Nevada, nor on any other mountain range of the earth. It exists here only, and all the individuals of its kind, so far as I can learn, are localised to this vicinity. They are embraced within a range of two hundred acres, and are enclosed in a basin of coarse siliceous material, surrounded by a sloping ridge of siliceous rock, which in some places projects above the soil. The basin is reeking with moisture, and in the lowest places the water is standing, and some of the largest trees dip their roots into the pools or water-runs. The trees of very large dimensions number considerably more than one hundred. Mr. Blake measured one ninety-four feet in circumference at the root; the side of which had been partly burnt by contact with another tree, the head of which had fallen against it. The latter can be measured four hundred and fifty feet from its head to its root. A large portion of this fallen monster is still to be seen and examined; and by the measurement of Mr. Lapham, the proprietor of the place, it is said

to be ten feet in diameter at three hundred and fifty feet from its upper root. In falling it had prostrated another large tree in its course, and pressed out the earth beneath itself so as to be imbedded a number of feet into the ground. Its diameter across its root, is forty feet. A man is nothing in comparison of dimensions, while walking on it or standing near its side. This to me was the greatest wonder of the forest. The tree which it prostrated in falling has been burnt hollow, and is so large, a gentleman who accompanied us from Murphy's informed us, that when he first visited the place two years ago, he rode through it on horseback for 200 feet without stooping, but at one spot as he entered at the root. We all walked many scores of feet through it, but a large piece of its side has fallen in near the head. But there are many standing whose magnitude absolutely oppress the mind with awe. In one place, three of these gigantic objects grow side by side, as if planted with special reference to their present appearance. Another so monstrous as to absolutely compel you to walk around it, and even lying, is divided at fifty feet to a hundred feet from the ground into three of these straight mammoth trunks, towering over three hundred feet into the sky. There are others, whose proportions are as delicate, symmetrical, clean and straight as small spruces, that rise three hundred and fifty feet from the ground. In one spot a huge knot of some ancient prostrate giant is visible above the soil, where it fell ages ago, and the earth has accumulated so as nearly to place the trunk of its former existence. The wood of this tree, I am told by Mr. Lapham, is remarkable for its slow decay. When first cut down its fibre is white, but it soon becomes reddish, and long exposure makes it as dark as mahogany; it is soft and resembles in some respects pine and cedar. Its bark, however, is much unlike these trees; nearest the ground it is prodigiously thick, fibrous, and when pressed on has a peculiar feeling of elasticity. In some places it is eighteen inches thick, and resembles a mass of cocoa-nut husks thickly matted and pressed together, while the fibrous material is exceedingly fine, and altogether unlike the husk of the cocoa-nut. This bark is fissured irregularly with numerous indentations, which give it the appearance of great inequality and roughness. A hundred and fifty feet from the ground it is only about two inches thick on the living tree, which is now being stripped of its bark for transportation from the country.

The cone of this tree is small and compact, and nearly regularly oval; and although the tree itself is the largest of the conifers, its fruit is as small as that of the dwarfish pines of North Carolina and Cape Cod. Its foliage is not, as a general thing, altogether agreeable to the eye, as the head of the tree is small in proportion to the size and height of the trunk. But the boughs, when examined more closely, are bright-green, rather complicated and delicate in structure, and pleasing to the mind by contrast with the rough and gigantic stem and branch from which they spring. The name that has been applied to this tree by Prof. Lindley, an English botanist, is *Washingtonia Gigantea*. By him it is declared to be so much unlike other conifers as not only to be a new species, but to require description as a new genus. Other botanists, of eminence, think differently. To this, however, he has seen fit to apply the name of an English hero, a step indicating as much personal arrogance or weakness as scientific indecency; for it must have been a prominent idea in the mind of that person that American Naturalists must regard with surprise and reluctance the application of a British name, however meritoriously honored, when a name so worthy of immortal honor and renown as that of WASHINGTON would strike the mind of the world as far more suitable to the most gigantic and remarkable vegetable wonder, indigenous to a country, where his name is the most distinguished ornament. As he and his generation declared themselves independent of all English rule and political dictation, so American Naturalists must in this case express their respectful dissent from all British scientific "stamp acts." If the "Big Tree" be not a *Taxodium*, let it be called now and forever *Taxodium Washingtonium*. If it should be properly ranked as a new genus, then let it be called to the end of time, *Washingtonia Californica*. The generic name indicates unparalleled greatness and grandeur; its specific name, the only locality in the world where it is found. No names can be more appropriate, and if it be in accordance with the views of American botanists, I trust the scientific honor of our country may be vindicated from foreign indecency by boldly discarding the name now applied to it, and by affixing to it that of the immortal man whose memory

we all love and honor, and teach our children to adore. Before many ages shall elapse the ruthless hand of man, or climatic changes, may totally annihilate the few giants of this remarkable race, now growing on and confined to this small basin in the Sierra Nevada. Seeds issued by me, planted and means employed to prolong its existence elsewhere, but few spots of earth, perhaps none, will be so eligible for its natural and complete development as its present locality. Under any and all circumstances, however, whether of perpetuity or extinction, the name of Wellington should be discarded, and that of WASHINGTON attached to it, and transmitted to the schools of future ages.

At this place is a very excellent public house, kept by an urbane proprietor, who spared no pains to interest us and give all information in his power. The half I heard or saw, I have not noted here. The hotel is built near the "Big Tree," whose bark was stripped last year and exhibited in San Francisco. An appendage of the house is built over it, and it constitutes a hall for collation parties; at the root it measures ninety-six feet in circumference, and a portion of its prostrate trunk is used for a bowling alley. To overthrow a hole was bored through it with a large auger, and after the trunk was mostly sawed off, attempts were made to wedge and upset it. But its immense size and weight prevented the success of this undertaking, and on the fourth day it fell by the force of a strong wind. In falling, it convulsed the earth, and by its weight forced the soil from beneath it so that it lies in a great trench, and mud and stones were driven near a hundred feet high, where they have left their marks on neighboring trees.

The coolest, purest, choicest water in the world is here. I have never tasted such water in all my wanderings over the earth. The well that supplies it is sunk twenty-two feet, through coarse sienitic sand and fine angular gravel, apparently the more unwatched detritus of the neighboring ridges of the basin, and the water stands twelve feet deep in the well.

Here we spent the night; rose early and inspected the forests, and contributed a large share of blood for the maintenance of the numerous muskets that infect the luxuriant undergrowth of the moist and teeming soil. The abundance of these pertinacious and venomous creatures was the only drawback to our enjoyment; but I have seen them no where else, away from the delta, and even during the night the cool temperature destroyed their activity here.

The night spent here was delightful. The moon shone with unparalleled splendor, and the atmosphere was so pure that it seemed as if the stars of heaven had quadrupled in number. I shall never forget this night, nor the first glimpses of the rising moon as her milky and pensive beams penetrated the waving foliage of two mighty giants not far from me. O glorious orb! how thou stolest the heart from strong men's breasts, and on thy lambent beams transported it halfway a continent and layest it down in the silent chambers of the beloved! Only assure us that thou lendest it thy pencils to paint pleasant dreams on the slumbering slopes of the little and the weary, and we will yield it gladly and rejoicingly to thy benign sway. As silent as is thy voice and influence, so sweetly shall that heart pass to its repose; and the images of the distant and beloved shall rise or vanish as thy beams brighten or the night grows dark.

Respectfully, yours, C. F. WINSLOW.

RAIN IN SACRAMENTO.—We were at our "Home" in Sacramento on the morning of the 21st, and were surprised on awakening to find a cool, cloudy morning, and at 6 A.M. to find the rain falling as gently as one of our old fashioned "April showers," in New England. After the preceding hot Sunday, the change was most agreeable. The air had a most delicious freshness—the birds sang their songs anew—children awoke merrily—the lambs were seen to sport friskily, and nature robed herself with a clean blue above and a bright green beneath. O there was a freshness that made all feel happy, for the memory of such showers awakes scenes of by-gone days, and the tear-drop stood in the eye of all, like as the dew-drop upon the new opened flower.

TO REMOVE MARKS FROM TABLE.—Hot dishes sometimes leave whitish marks on varnished tables, when set, as they should not be, carelessly upon them. To remove it, pour some lamp oil on the spot, and rub it hard with a soft cloth. Then pour on a little spirits, and rub it dry with another cloth, and the white mark will disappear, leaving the table as bright as before.

FIG. 1. Original description by Winslow of *Taxodium Washingtonium* and *Washingtonia Californica*.

Hooker's Journal of Botany and Kew Garden Miscellany (7: 29, 1855); and this reprint was reprinted in the *Gardeners' Chronicle and Agricultural Gazette* (1: 7–8, 1855, January 6). In both of these, the significant phrase appears as, "If the 'Big Tree' be a *Taxodium*, let it be called . . . *Taxodium Washingtonium*." Thus, the editors had altered the quoted passage, removing the negative that was in the original by Winslow, viz: "If the 'Big Tree' be *not* [italics ours] a *Taxodium*, let it be called now and forever *Taxodium Washingtonium*." Winslow wrote well-phrased and grammatical English, so there is little doubt but that if he had been allowed to proof-read his letter before publication he would have removed the "not" which made the sentence nonsensical. If he deemed the tree not to be a *Taxodium*, why would he coin a name for it in that genus? Two generations later, G. B. Sudworth revived this first name of Winslow's, but he altered its spelling to *Sequoia washingtoniana* (Winslow) Sudw. (1897: 61–62). Here he made the new combination without explanation or discussion, but later (1898: 28–29; and 1927: 32–33) again used the name and here gave a lengthy explanation. He found the name valid under Article VI of the Rochester Code of Nomenclature, which he was following. That code is no longer used, but Sudworth's concluding paragraph concerning this article is worth quoting.

In interpreting the fundamental object of this article cited for the publication of species and applying it to all cases likely to arise, it would seem the duty of the interpreter to abide by the principle involved in the law, and to be influenced rather by the actual meaning of the describer's combined words than by his unfortunate lack of technical procedure in description.

These check lists of tree names by Sudworth were official for the United States Forest Service, so the names in it were used by the foresters, but *Sequoia washingtoniana* (Winslow emend. Sudw.) Sudw. was little used by botanists. It was, however, adopted by J. G.

Lemmon (1898: 171–172), former botanist of the California State Board of Forestry, and is currently used by Harlow and Harrar (1941: 193).

To return to the two names published by Winslow, *Taxodium Washingtonium* and *Washingtonia Californica*, we note that he did not assert that the name *Wellingtonia gigantea* Lindl. was invalid. As an American he disliked having the American big tree named for a British general, consequently he deliberately renamed it. It was unknown to the layman Winslow that Lindley's generic name *Wellingtonia* happened to be illegitimate, being a later homonym of *Wellingtonia* Meisner published in 1840 for a member of the Sabiaceae. So, actually, the new generic name by Lindley was invalid, and as a distinct genus the tree still needed a name, but what of the specific epithet *gigantea* given by Lindley? The earlier *Sequoia gigantea* Endl. (1847) was based on a sterile specimen collected by David Douglas; on a published letter of Douglas' referring apparently to the redwood; and on two references to Hooker and Arnott's names in *The Botany of Captain Beechey's Voyage*, in part referring back to the same Douglas reference, in part to *Abies religiosa*, and in part to *Abies bracteata*. When Lindley first published his *W. gigantea*, he introduced the subject by discussing the basis of *Sequoia gigantea* Endl. and eliminating it (1853a: 819). Lindley then briefly described a specimen of the big tree sent by Lobb from the Sierra Nevada [Nevada] of California. He named it *Wellingtonia gigantea*. It is perfectly clear from the previous context that the specific epithet used here, *gigantea*, was new, not one transferred from the confused and illegitimate *Sequoia gigantea* Endl. In consequence, the specific epithet *gigantea*, published in 1855 by Lindley, was legitimate, the first such one for the tree in question. So, when Winslow cited Lindley's binomial, the real basis of his concept, he had no right to reject Lindley's specific epithet *gigantea*. It has priority over the specific epithets of both the binomials proposed by

Winslow. Essentially, Winslow proposed two names for the big tree, representing two possible taxonomic placements — *Taxodium Washingtonium* or *Washingtonia Californica*. He gave more discussion of the name *Washingtonia*, but upon careful analysis it is seen that Winslow expressed no opinion, made no choice. He said (or meant to say), if it is considered a species of *Taxodium*, call it *T. Washingtonium*; if it is a genus, let it be called *Washingtonia Californica*. Under the International Code of Botanical Nomenclature (1952), a portion of Article 43 applies here: "A name . . . (2) which is merely proposed in anticipation of future acceptance of the group concerned, or of a particular circumscription, position or rank of the group (so-called provisional name), . . . is not validly published." The two names published by Winslow might fall under the class of alternative names, and these are proscribed, but only if published after Jan. 1, 1953. By implication, if published before 1953, alternative names are valid. However, they equally well fall under the first section of Article 43: "A name (1) which is not accepted by the author who published it, . . . is not validly published." By this provision both of Winslow's names are invalid. The fact that he proposed two of them without himself accepting either, does not necessarily protect them as alternative names, because he, the publishing author, did not accept them himself and they are in every sense provisional names. Also applicable is Article 73, "A name is illegitimate in the following cases: (1) If it was nomenclaturally superfluous when published, i.e. if the taxon to which it was applied, as circumscribed by its author, included the type of a name or epithet which ought to have been adopted under one or more of the rules." The epithet *gigantea* of Lindley was available for use under either *Taxodium* or *Washingtonia*. The fact that Winslow did not adopt it in either genus, renders his two epithets superfluous and illegitimate.

Taxodium giganteum (Lindl.) Kellogg &

Behr (1855 [see ed. 2, 1873]: 51) was a name that appeared in print in a San Francisco newspaper, *The Pacific*, in a report of a meeting of the California Academy of Sciences on May 7, 1855. The two authors reported on this "Great Tree" of California. They published a new binomial for it and a four-line Latin diagnosis, then a long and detailed description in English. This description is more nearly complete than the previously published ones. It may have been wholly independent, even though numerous descriptive words and phrases are suspiciously like the ones used by Lindley in his earlier description of *Wellingtonia gigantea*. However, the description is longer and contains new details and larger measurement of height and diameter of tree. Hence, it seems certain that many of the details were from new reports or personal examination of specimens of the tree. Their binomial has usually been regarded as a new and independent name. It must be noted, however, that in their introductory paragraph it is stated that they "reported on the species of *Taxodium*, improperly described by English authors as *Wellingtonia*. . . ." They thus referred to the earlier publication of the tree by the Englishman, Professor John Lindley, as *Wellingtonia gigantea*. To the writers, it seems that the new name printed by Kellogg and Behr is better considered a transfer based upon *Wellingtonia gigantea* Lindl. Neither of the two alternative interpretations of the authorship has any great importance now. Botanists of today do not consider that this big tree belongs in the genus *Taxodium*, so this particular generic placement is not accepted. As a specific epithet, *giganteum*, if new with Kellogg and Behr, is later than its original publication as *Wellingtonia gigantea* Lindl. (1853) and of *Sequoia gigantea* (Lindl.) Dcne. (1854), so one of these two epithets, as the earlier, was available for transfer to some other genus, but not to *Sequoia*, because of the still earlier *Sequoia gigantea* Endl. (1847), which is a synonym of *S. sempervirens*.

Sequoia Wellingtonia Seemann (1855: 27)

was published in a column of current notes, without a real title to the article, but signed by Seemann, the editor of the journal. He referred to the article in which Winslow rejected as distasteful the name *Wellingtonia gigantea* Lindl. for the big tree and proposed for it the provisional names *Taxodium Washingtonium* and *Washingtonia Californica*. Seemann rejected both of Winslow's names as invalid. Then in a footnote he mentions examining at Kew the specimens on which *Wellingtonia* was founded. He observed that they were identical with *Sequoia sempervirens*, saying, "Der Unterschied steht einzig und allein auf dem Papiere, nicht in der Natur." Though boldly stated in this manner, his meaning was, apparently, that he found no generic distinctions between *Wellingtonia* and *Sequoia*. He pointed out that the specific epithet *gigantea* could not be transferred to *Sequoia*, as it would there be a later homonym of *S. gigantea* Endl. He then proposed a new name for the big tree—*Sequoia Wellingtonia* Seem.—and mentioned receiving satisfactory dried specimens of it from Herr F. Scheer. From the context, and from the fact that he was renaming Lindley's *Wellingtonia gigantea*, it is evident that Seemann's new specific epithet was the generic name of Lindley. Hence, Seemann wrote it, and it may still be written, *Sequoia Wellingtonia*, the specific epithet being capitalized. This binomial supplied the first legitimate specific epithet for the big tree in the genus *Sequoia*. Three years later Seemann published (1858) an extended account of his *Sequoia Wellingtonia*. It already had an extensive literature, and his brief references added up to half a column. For instance, in the year 1856, there were in the *Gardeners' Chronicle* references to the big tree in 14 different articles. Seemann summarized these accounts, both the nontechnical accounts of the tree and the impressions of it by travelers. He referred to the publication by Lindley of the big tree as a separate genus *Wellingtonia gigantea* and recounted how this was resented by many Americans as a national affront. An

American on the Atlantic coast renamed it *Americus gigantea*, while one on the Pacific coast renamed it *Taxodium Washingtonium* or *Washingtonia Californica*. Seemann had in 1855 formed the opinion that the big tree was not generically distinct from the redwood and had curtly rejected Lindley's genus *Wellingtonia*. Again, in this second account he kept to this view. He tabulated the synonymy of the two species, *Sequoia sempervirens* and *Sequoia Wellingtonia*, and for the latter recorded the vernacular names, "Mammoth-tree, Big-tree, Wellingtonie."

For *Sequoia Wellingtonia*, Seemann published a large, full-length engraving. He detailed the location of the several known groves. He gave the various estimated and recorded sizes of the trees and estimates of their ages. Then, finally (p. 353), he gave a methodical description of the big tree, its trunk, bark, wood, leaf forms, and briefly of the flowers and cones. This lengthy account in 1858 completed, but maintained unchanged, his concept of *Sequoia Wellingtonia* Seem. first published in 1855.

For those botanists who refuse to recognize the big tree as a genus and insist on retaining it in the same genus as the redwood, the first legitimate name is *Sequoia Wellingtonia* Seem. (1855). This was adopted by Lemmon (1898: 171–172). A repressed choice for this classification was indicated by Little (1944: 277) in his new check list of the trees of the United States. He said, "*S. wellingtonia* is the proper name since 1930 under the International Rules of Botanical Nomenclature. A majority of the botanists in California consulted prefer to continue the illegitimate name *Sequoia gigantea*, which is so well established in many publications about these remarkable trees. In the interests of uniformity and of elimination of confusion in names, the name *S. gigantea* is here accepted by the Forest Service committee, though my [Little's] personal choice would be *S. wellingtonia*." It seems that Little was overruled by the other five members of the committee which consisted of his senior

dendrologist, Dayton (who had previously polled the Californian botanists and reported their preference for *S. gigantea*), of a representative of wildlife management, a wood technologist, one of timber management, and one of range management. Little rejected the tree as a genus, classified it in *Sequoia*, understood the rules of nomenclature and correctly applied them, and his chosen name was then rejected by the committee representing the various branches of forestry.

Gigantabies Wellingtoniana J. Nelson (published under the pseudonym Senilis) (1866: 79-83) included a new specific epithet for the big tree. We have already discussed the status of *Gigantabies* while considering the generic names of the big tree. Nelson explained at length and in effusive style that his deliberate renaming of *Wellingtonia gigantea* Lindl. was because of his dislike of generic names honoring people. He included a lengthy description, citation of its occurrence in Calaveras County, Upper California, mention of visitors who had reported about the grove—Murray, Black, Grosvenor, Renny, and others—but did not cite any actual specimens. It is perfectly clear that his names applied to the big tree previously described and given legitimate specific epithets by Lindley and by Seemann, and that he knew of one, if not of both, of these epithets. His epithet was superfluous and illegitimate. From the 1952 International Code, the following apply: Article 73, "A name is illegitimate in the following cases: (1) If it was nomenclaturally superfluous when published. . . ." Also, Article 79, "Specific and infraspecific epithets are illegitimate in the following special cases and must be rejected . . . (4) When they were published in works in which the Linnean system of binary nomenclature for species was not consistently employed." Both of these rules apply and definitely outlaw the epithet *Wellingtoniana* of Nelson.

CONCLUSION: For those botanists who, like the writers, see generic significance in the impressive total of fundamental morpholo-

gical differences briefly stated herewith, the big tree was correctly classified by Buchholz (1939: 536) as *Sequoiadendron giganteum* (Lindl.) Buchholz, but because of the existence of the earlier name *Americus* Anon., we propose that the generic name *Sequoiadendron* be made a nomen genericum conservandum.

SUMMARY

The proposal in 1939 by Buchholz that the Californian big tree, formerly placed in *Sequoia*, be classified as a monotypic genus, *Sequoiadendron*, is reviewed. The morphological differences between the two are numerous and generically significant, so the latter is accepted as a distinct genus. The botanical and nomenclatural history of the two is reviewed. The redwood remains unchanged as *Sequoia sempervirens* (D. Don in Lamb.) Endl. For those who insist that the big tree must remain in that same genus, the legitimate name is *Sequoia Wellingtonia* Seem. For those who agree with the writers that the big tree is amply distinct and represents a genus, there are still problems in nomenclature. The generic name *Wellingtonia* Lindl. is a later homonym and illegitimate. *Washingtonia* Winslow is a later homonym and invalid. *Gigantabies* J. Nelson is not a generic name. *Americus* Anon. is legitimate, but not worthy of adoption. *Steinhauera* Presl, based upon fossil plants, is illegitimate for application to a genus of living plants. *Sequoiadendron* Buchholz is a good name, based upon careful and original research on the plants. Though later than *Americus*, we propose that *Sequoiadendron* be adopted as a nomen genericum conservandum. Among the published specific epithets, the following are illegitimate and unavailable for use with *Sequoiadendron*: *Sequoia gigantea* Endl., *S. Wellingtonia* Seem., *S. gigantea* Dcne., *Taxodium Washingtonium* Winslow, *Washingtonia Californica* Winslow, *Gigantabies Wellingtoniana* J. Nelson, *S. washingtoniana* (Winslow emend. Sudw.) Sudw., and *Steinhauera gigantea* (Lindl.) Ktze. in Voss. The first available epithet was published in the binomial *Wellington-*

tonia gigantea Lindl., and this epithet, distinct from the earlier *Sequoia gigantea* Endl., is definitely based upon the big tree and is available for use in the combination *Sequoia-dendron giganteum* (Lindl.) Buchholz, if that generic name is subsequently conserved, as here recommended.

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